



Method of Producing a Brush Having a Bristle Plate

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Field of Invention

[0001] The invention relates to a method of producing brushes by connecting plates of a plastic material, having each tufts of brush bristles attached thereto and projecting from a first face, to an attachment surface portion of a brush body made of plastic, in particular the same plastic, by means of ultrasonic welding or gluing.

Background of the Invention

[0002] It is known in brush making to attach tufts of bristles to carrier plates which are then attached to a brush body. The attachment of the carrier plates to the brush bodies can be done by welding, in particular when the carrier plates and the brush bodies are made of the same plastic material. At the junction between the carrier plate and the surface of the brush body a gap may be produced which is undesirable both for reasons of aesthetics and also for reasons of hygiene.

Brief Summary of the Invention

[0003] The invention provides a method of reliably connecting the carrier plate to the brush body without an undesirably large gap remaining between the carrier plate and the brush body.

[0004] In accordance with a first aspect of the invention, the plastic materials of the plate and the brush body are connected by ultrasonic welding. Formed on the peripheral rim of the plate is an edge facing the brush body and acting as an energy concentrator in ultrasonic welding. Welding is therefore effected with high precision, so that also in mass production such as in the case of toothbrushes, for example, the plate is attached to the brush body with a precise fit. The edge preferably tapers toward the brush body. In an advantageous embodiment of the method the brush body is provided with a recess into which the plate can be inserted with a precise fit. The gap remaining between the outer edge of the plate and the rim of the recess will then be very small and barely perceptible.

[0005] In this embodiment of the method, the edge engages the bottom of the recess by its tapered end, so that the weld joint is produced at the bottom of the recess. The welding process is further assisted by a pressing means which presses the plate against the bottom of

the recess of the brush body.

[0006] Preferably, an extension projecting beyond the recess of the brush body is formed at the peripheral rim of the plate. This extension may extend over the entire periphery of the plate or only over a part thereof, preferably over that part which extends as far as into the neck piece of the brush body in the case of a toothbrush. Bending loads occur at this point which cause any gap that possibly remains between the plate and the brush body to be opened when the head of the toothbrush is bent back in use. This extension, too, is preferably provided with a tapered edge which faces the brush body and acts as an energy concentrator in ultrasonic welding.

[0007] Any gap that may still be left between the plate and the brush body may be closed by a finishing treatment, in particular by filling it with a suitable plastic mass. More particularly, the brush body with the plate already fitted therein may be placed in an injection mold which is used to apply a molding over the gap so as to completely fill it and close it.

[0008] In an alternative embodiment of the method according to the invention, the brush body is provided with a recess into which the plate is inserted with a precise fit and attached there by means of an adhesive. Also in this embodiment, any gap possibly left between the plate and the brush body may be closed by molding in an injection mold.

[0009] In a further embodiment of the invention, the plates are attached to the brush bodies using a combination of ultrasonic welding and glueing. In particular, the load-bearing fastening of the plate may be performed by welding it to the bottom of the recess of the brush body, whereas the adhesive is introduced into the gap remaining between the plate and the brush body and fills the same.

Short Description of the Drawings

[0010] Further features and advantages of the invention will be apparent from the following description of several embodiments of the method and from the drawings to which reference is made and in which:

[0011] Figure 1 is a schematic sectional view of the head portion of a toothbrush which may be manufactured in the method according to the invention;

[0012] Figure 2 shows a top view of the head portion of the toothbrush;

[0013] Figure 3 is a schematic sectional view of a toothbrush deformed by bending loads in use;

[0014] Figure 4 is an enlarged view of a section taken through the head portion of a toothbrush manufactured in accordance with a preferred embodiment of the method;

[0015] Figure 5 shows a detailed view of the plate used in the embodiment of the method illustrated in Figure 4;

[0016] Figure 6 shows a top view of the head of a toothbrush in accordance with the embodiment of Figure 4; and

[0017] Figures 7 to 12 show sectional and partial views of toothbrushes which may be manufactured by employing several variants of the invention embodiments of the method.

Detailed Description of the Invention

[0018] In the embodiment of the method shown in Figure 1 a recess 12 is formed in the head portion of a toothbrush body 10. A carrier plate 14 is fittingly inserted in this recess 12. The carrier plate 14 has a number of through holes having tufts 16 of bristles inserted and fastened therein. An edge 18 is formed on the peripheral rim of the carrier plate 14 and tapers toward the bottom of the recess 12. The brush body 10 and the plate 14 are preferably made of the same plastic, such as, e.g., polypropylene.

[0019] An apparatus for making such a toothbrush using the method according to the invention comprises an ultrasonic welding device and a pressing means. The ultrasonic welding device acts, just like the pressing means, on the peripheral rim of the carrier plate 14, with the tapered edge 18 acting as an energy concentrator, with the result that a reliable load-bearing weld joint is produced at the bottom of the recess 12 between the brush body 10 and the plate 14.

[0020] The welding is effected with high precision so as to ensure a very precise fit of the plate 14 on the brush body 10.

[0021] But a small gap may still remain between the peripheral rim of the plate 14 and the surface of the brush body 10 surrounding the plate.

[0022] As is illustrated in Figure 3, this gap 20 may become wider by the bending load occurring when the toothbrush is in use.

[0023] This is prevented in the embodiment of the method as shown in Figure 4 by providing the plate 14 with an extension 14a which extends as far as into the neck region of the brush body. In order to make sure that this extension 14a is securely welded to the brush body 10, the extension 14a is likewise provided with a tapered edge 14b on its side facing the brush body, the edge 14b acting as an energy concentrator in ultrasonic welding.

[0024] In the embodiment shown in Figure 7, the recess 12 is provided with a stepped shape at its peripheral rim and the plate 14 is provided with a peripheral rim designed to match this shape.

[0025] In the embodiment as shown in Figure 8, a peripheral rim 14c is formed on the plate 14 which projects beyond the main body of the plate and has a tapered edge which rests on the surface of the brush body 10 surrounding the recess 12. In this embodiment an ultrasonic welding is also performed over the entire periphery of the plate 14.

[0026] In the embodiment of the method as shown in Figure 9, after the welding process the plate 14 has been pressed against the brush body 10 and has formed an intimate bond therewith over its entire periphery, so that no gap is produced at the junction between the plate 14 and the brush body 10.

[0027] In the embodiment as shown in Figure 10 the recess 12 has an oblique peripheral wall converging toward the inside of the brush body 10. The plate 14 has a peripheral wall of matching obliqueness, so that it is ensured that the plate 14 fits in the recess of the brush body with no gap in between. As in the embodiments shown above, the plate may in addition be provided with a tapered edge for welding to the bottom of the recess 12.

[0028] As shown in Figures 11 and 12, any gap possibly left between the plate and the brush body may be closed by filling it with a plastic mass. It is particularly expedient to fill this gap with a plastic mass by injection molding in an injection mold. By selecting an elastomer as the plastic mass, the plate will be given an elastic support on the brush body from all sides which can be used to cushion vibrations occurring in use.

[0029] In all of the embodiments shown, the connection of the plate 14 with the brush body 10 may alternatively or additionally be effected by means of an adhesive. The adhesive may also or additionally perform the function of filling any gap remaining between the plate and the brush body, thus removing the gap.

Abstract

A method of producing brushes by connecting plates of a plastic material, having each tufts of brush bristles attached thereto and projecting from a first face, to an attachment surface portion of a brush body made of plastic, in particular the same plastic, by means of ultrasonic welding or gluing. Each of the plates has a peripheral rim facing the brush body and having an edge formed thereon which acts as an energy concentrator in ultrasonic welding.